



## SEQUENCE LISTING

<110> THE REGENTS OF THE UNIVERSITY OF CALIFORNIA  
FAN, Hung Y.  
PALMARINI, Massimo  
SHARP, James M.

<120> A LUNG CANCER ASSOCIATED RETROVIRUS, GENE DELIVERY VECTOR AND  
METHODS OF USE THEREOF

<130> UCI1150-1

<140> US 10/030,441

<141> 2002-05-16

<150> PCT/US 00/18856

<151> 2000-07-08

<150> US 60/142,868

<151> 1999-07-08

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<170> PatentIn version 3.1

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Thr Val Asn Leu Glu Thr Trp Lys Lys Val Gly Glu Gln Ile Arg Thr  
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His Tyr Thr Leu His Gly Pro Glu Lys Val Pro Val Glu Thr Leu Ser  
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Lys Arg Leu Gly Asn Leu Leu Lys Gln Glu Glu Asp Pro Leu His Thr  
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 195 200 205

Pro Pro Ala Tyr Ala Pro Ser Val Val Ala Gly Leu Asp Pro Pro Pro  
 210 215 220

Gly Pro Leu Pro Pro Ser Lys Asn Met Ser Pro Leu Gln Lys Ala Leu  
 225 230 235 240

Arg Gln Ala Gln Arg Leu Gly Glu Val Val Ser Asp Phe Ser Leu Ala  
 245 250 255

Phe Pro Val Phe Glu Asn Asn Asn Gln Arg Tyr Tyr Glu Ser Leu Pro  
 260 265 270

Phe Lys Gln Leu Lys Glu Leu Lys Ile Ala Cys Ser Gln Tyr Gly Pro  
 275 280 285

Thr Ala Pro Phe Thr Ile Ala Met Ile Glu Asn Leu Gly Thr Gln Ala  
 290 295 300

Leu Pro Pro Asn Asp Trp Lys Gln Thr Ala Arg Ala Cys Leu Ser Gly  
 305 310 315 320

Gly Asp Tyr Leu Leu Trp Lys Ser Glu Phe Phe Glu Gln Cys Ala Arg  
 325 330 335

Ile Ala Asp Val Asn Arg Gln Gln Gly Ile Gln Thr Ser Tyr Glu Met  
 340 345 350

Leu Ile Gly Glu Gly Pro Tyr Gln Ala Thr Asp Thr Gln Leu Asn Phe  
 355 360 365

Leu Pro Gly Ala Tyr Ala Gln Ile Ser Asn Ala Ala Arg Gln Ala Trp  
 370 375 380

Lys Lys Leu Pro Ser Ser Ser Thr Lys Thr Glu Asp Leu Ser Lys Val  
 385 390 395 400

Arg Gln Gly Pro Asp Glu Pro Tyr Gln Asp Phe Val Ala Arg Leu Leu  
 405 410 415

Asp Thr Ile Gly Lys Ile Met Ser Asp Glu Lys Ala Gly Met Val Leu  
 420 425 430

Ala Lys Gln Leu Ala Phe Glu Asn Ala Asn Ser Ala Cys Gln Ala Ala  
 435 440 445

Leu Arg Pro Tyr Arg Lys Lys Gly Asp Leu Ser Asp Phe Ile Arg Ile  
 450 455 460

Cys Ala Asp Ile Gly Pro Ser Tyr Met Gln Gly Ile Ala Met Ala Ala  
 465 470 475 480

Ala Leu Gln Gly Lys Ser Ile Lys Glu Val Leu Phe Gln Gln Gln Ala  
 485 490 495

Arg Asn Lys Arg Gly Arg Gln Arg Ser Gly Asn Ser Gly Cys Phe Val  
 500 505 510

Cys Gly Gln Pro Gly His Arg Ala Ala Val Cys Pro Gln Lys Gln Gln  
 515 520 525

Ser Pro Val Asn Thr Pro Asn Leu Cys Pro Arg Cys Lys Lys Gly Lys  
 530 535 540

His Trp Ala Arg Asp Cys Arg Ser Lys Thr Asp Val Gln Gly Thr Pro  
 545 550 555 560

Leu Pro Pro Val Ser Gly Asn Trp Val Arg Gly Gln Pro Leu Ala Pro  
 565 570 575

Lys Gln Cys Tyr Gly Ala Thr Leu Gln Val Pro Lys Glu Pro Leu Gln  
 580 585 590

Thr Ser Val Glu Pro Gln Glu Ala Ala Arg Asp Trp Thr Ser Val Pro

595                                      600                                      605  
 Pro Pro Thr Gln Tyr  
 610  
  
 <210> 12  
 <211> 616  
 <212> PRT  
 <213> Artificial sequence  
  
 <220>  
 <223> Derived from JSRVenv  
  
 <400> 12  
  
 Met Gly Gln Thr His Ser Arg Gln Leu Phe Val His Met Leu Ser Val  
 1                                      5                                      10                                      15  
  
 Met Leu Lys His Arg Gly Ile Thr Val Ser Lys Pro Lys Leu Ile Asn  
                                     20                                      25                                      30  
  
 Phe Leu Ser Phe Ile Glu Glu Val Cys Pro Trp Phe Pro Arg Glu Gly  
                                     35                                      40                                      45  
  
 Thr Val Asn Leu Glu Thr Trp Lys Lys Val Gly Glu Gln Ile Arg Thr  
                                     50                                      55                                      60  
  
 His Tyr Thr Leu His Gly Pro Glu Lys Ile Pro Val Glu Thr Leu Ser  
 65                                      70                                      75                                      80  
  
 Phe Trp Thr Leu Ile Arg Asp Cys Leu Asp Phe Asp Asn Asp Glu Leu  
                                     85                                      90                                      95  
  
 Lys Arg Leu Gly Asn Leu Leu Lys Gln Glu Glu Asp Pro Leu His Val  
                                     100                                      105                                      110  
  
 Pro Asp Ser Glu Pro Arg Tyr Ala Val Pro Glu Gly Val Lys Ser Asp  
                                     115                                      120                                      125  
  
 Pro Pro Phe Ser Asn Leu Leu His Pro Ser Asp Asn Asp Asp Leu Leu  
                                     130                                      135                                      140  
  
 Ser Ser Thr Asp Glu Ala Glu Leu Asp Glu Glu Ala Ala Lys Tyr His  
 145                                      150                                      155                                      160  
  
 Gln Glu Asp Trp Gly Phe Leu Ala Gln Glu Lys Gly Ala Leu Thr Ser  
                                     165                                      170                                      175

Lys Asp Glu Leu Val Glu Cys Phe Lys Asn Leu Thr Ile Ala Leu Gln  
 180 185 190

Asn Ala Gly Ile Lys Leu Pro Ser Asn Asn Ala Lys Ser Pro Ser Ala  
 195 200 205

Pro Pro Leu Pro Pro Ala Tyr Ala Pro Ser Val Val Ala Gly Leu Asp  
 210 215 220

Pro Pro Pro Gly Pro Pro Pro Pro Ser Glu Asn Met Ser Pro Leu Gln  
 225 230 235 240

Lys Ala Leu Arg Gln Ala Gln Arg Leu Gly Glu Val Val Ser Asp Phe  
 245 250 255

Ser Leu Ala Phe Pro Val Phe Glu Asn Asn Asn Gln Arg Tyr Tyr Glu  
 260 265 270

Ser Leu Pro Phe Lys Gln Leu Lys Glu Leu Lys Ile Ala Cys Ser Gln  
 275 280 285

Tyr Gly Pro Thr Ala Pro Phe Thr Ile Ala Met Ile Glu Asn Leu Gly  
 290 295 300

Thr Gln Ala Leu Pro Pro Asn Asp Trp Lys Gln Thr Ala Arg Ala Cys  
 305 310 315 320

Leu Ser Gly Gly Asp Tyr Leu Leu Trp Lys Ser Glu Phe Phe Glu Gln  
 325 330 335

Cys Ala His Ile Ala Asp Val Asn Arg Gln Gln Gly Ile Gln Thr Ser  
 340 345 350

Tyr Glu Met Leu Ile Gly Glu Gly Pro Tyr Gln Ala Thr Asp Thr Gln  
 355 360 365

Leu Asn Phe Leu Pro Gly Ala Tyr Ala Gln Ile Ser Asn Ala Ala Arg  
 370 375 380

Gln Ala Trp Lys Lys Leu Pro Ser Ser Ser Thr Lys Thr Glu Asp Leu  
 385 390 395 400

Ser Lys Val Arg Gln Gly Pro Asp Glu Pro Tyr Gln Asp Phe Val Ala  
 405 410 415

Arg Leu Leu Asp Thr Ile Gly Lys Ile Met Ser Asp Glu Lys Ala Gly



420					425					430					
Met	Val	Leu	Ala	Lys	Gln	Leu	Ala	Phe	Glu	Asn	Ala	Asn	Ser	Ala	Cys
		435					440					445			
Gln	Ala	Ala	Leu	Arg	Pro	Tyr	Arg	Lys	Lys	Gly	Asp	Leu	Ser	Asp	Phe
	450					455					460				
Ile	Arg	Ile	Cys	Ala	Asp	Ile	Gly	Pro	Ser	Tyr	Met	Gln	Gly	Ile	Ala
465						470					475				480
Met	Ala	Ala	Ala	Leu	Gln	Gly	Lys	Ser	Ile	Lys	Glu	Val	Leu	Phe	Gln
				485					490					495	
Gln	Gln	Ala	Arg	Asn	Lys	Lys	Gly	Leu	Gln	Lys	Ser	Gly	Asn	Leu	Gly
			500					505					510		
Cys	Phe	Val	Cys	Gly	Gln	Pro	Gly	His	Arg	Ala	Ala	Val	Cys	Pro	Gln
		515					520					525			
Lys	Gln	Gln	Ser	Pro	Val	Asn	Thr	Pro	Asn	Leu	Cys	Pro	Arg	Cys	Lys
	530					535					540				
Lys	Gly	Lys	His	Trp	Ala	Arg	Asp	Cys	Arg	Ser	Lys	Thr	Asp	Val	Gln
545						550					555				560
Gly	Asn	Pro	Leu	Pro	Pro	Val	Ser	Gly	Asn	Trp	Val	Arg	Gly	Gln	Pro
				565					570					575	
Leu	Ala	Pro	Lys	Gln	Cys	Tyr	Gly	Ala	Thr	Leu	Gln	Val	Pro	Lys	Gly
			580					585					590		
Pro	Leu	Gln	Thr	Ser	Val	Glu	Pro	Gln	Glu	Ala	Ala	Arg	Asp	Trp	Thr
		595					600					605			
Ser	Val	Pro	Pro	Pro	Thr	Gln	Tyr								
	610					615									

&lt;210&gt; 13

&lt;211&gt; 616

&lt;212&gt; PRT

&lt;213&gt; Artificial sequence

&lt;220&gt;

&lt;223&gt; Derived from JSRVenv

&lt;400&gt; 13

Met Gly Gln Thr His Ser Arg Gln Leu Phe Val His Met Leu Ser Val  
 1 5 10 15  
 Met Leu Lys His Trp Gly Ile Thr Val Ser Lys Pro Lys Leu Ile Asn  
 20 25 30  
 Phe Leu Ser Phe Ile Glu Glu Val Cys Pro Trp Phe Pro Arg Glu Gly  
 35 40 45  
 Thr Val Asn Leu Glu Thr Trp Lys Lys Val Gly Glu Gln Ile Arg Thr  
 50 55 60  
 His Tyr Thr Leu His Gly Pro Glu Lys Ile Pro Val Glu Thr Leu Ser  
 65 70 75 80  
 Phe Trp Thr Leu Ile Arg Asp Cys Leu Asp Phe Asp Asn Asp Glu Leu  
 85 90 95  
 Lys Cys Leu Gly Asn Val Leu Lys Gln Glu Glu Asp Pro Leu His Val  
 100 105 110  
 Pro Asp Ser Glu Pro Arg Tyr Ala Val Pro Glu Gly Val Lys Ser Asp  
 115 120 125  
 Pro Pro Phe Ser Asn Leu Leu Arg Pro Ser Asp Asn Asp Asp Leu Leu  
 130 135 140  
 Ser Ser Thr Asp Glu Ala Glu Leu Asp Glu Glu Ala Ala Lys Tyr His  
 145 150 155 160  
 Gln Glu Asp Trp Gly Phe Leu Ala Gln Glu Lys Gly Ala Leu Thr Ser  
 165 170 175  
 Lys Val Glu Leu Val Glu Cys Phe Lys Asn Leu Thr Ile Ala Leu Gln  
 180 185 190  
 Asn Ala Gly Ile Lys Leu Pro Ser Asn Asn Ala Lys Ser Pro Ser Ala  
 195 200 205  
 Pro Pro Leu Pro Pro Ala Tyr Ala Pro Ser Val Val Ala Gly Leu Asp  
 210 215 220  
 Pro Pro Pro Gly Pro Pro Pro Ser Glu Asn Met Ser Pro Leu Gln  
 225 230 235 240  
 Lys Ala Leu Arg Gln Ala Gln Arg Leu Gly Glu Val Val Ser Asp Phe



Gln Gln Ala Arg Asn Lys Lys Gly Leu Gln Lys Ser Gly Asn Ser Gly  
500 505 510

Cys Phe Val Cys Gly Gln Pro Gly His Arg Ala Ala Val Cys Pro Gln  
515 520 525

Lys Gln Gln Ser Pro Val Asn Thr Pro Asn Leu Cys Pro Arg Cys Lys  
530 535 540

Lys Gly Lys His Trp Ala Arg Asp Cys His Ser Lys Thr Asp Val Gln  
545 550 555 560

Gly Asn Pro Leu Pro Pro Val Ser Gly Asn Trp Val Arg Gly Gln Pro  
565 570 575

Leu Ala Pro Lys Gln Cys Tyr Gly Ala Thr Leu Gln Val Pro Lys Gly  
580 585 590

Pro Leu Gln Thr Ser Val Glu Pro Gln Glu Ala Ala Arg Asp Trp Thr  
595 600 605

Ser Val Pro Pro Pro Thr Gln Tyr  
610 615

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<210> 14
<211> 615
<212> PRT
<213> Ovine pulmonary adenocarcinoma virus
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<400> 14

Met Pro Lys Arg Arg Ala Gly Phe Arg Lys Gly Trp Tyr Ala Arg Gln  
1 5 10 15

Arg Asn Ser Leu Thr His Gln Met Gln Arg Met Thr Leu Ser Glu Pro  
20 25 30

Thr Ser Glu Leu Pro Thr Gln Arg Gln Ile Glu Ala Leu Met Arg Tyr  
35 40 45

Ala Trp Asn Glu Ala His Val Gln Pro Pro Val Thr Pro Thr Asn Ile  
50 55 60

Leu Ile Met Leu Leu Leu Leu Gln Arg Val Gln Asn Gly Ala Ala  
65 70 75 80

Ala Ala Phe Trp Ala Tyr Ile Pro Asp Pro Pro Met Ile Gln Ser Leu  
                             85                            90                            95

Gly Trp Asp Arg Glu Ile Val Pro Val Tyr Val Asn Asp Thr Ser Leu  
                             100                            105                            110

Leu Gly Gly Lys Ser Asp Ile His Ile Ser Pro Gln Gln Ala Asn Ile  
                             115                            120                            125

Ser Phe Tyr Gly Leu Thr Thr Gln Tyr Pro Met Cys Phe Ser Tyr Gln  
                             130                            135                            140

Ser Gln His Pro His Cys Ile Gln Val Ser Ala Asp Ile Ser Tyr Pro  
                             145                            150                            155                            160

Arg Val Thr Ile Ser Gly Ile Asp Glu Lys Thr Gly Lys Lys Ser Tyr  
                             165                            170                            175

Gly Asn Gly Ser Gly Pro Leu Asp Ile Pro Phe Cys Asp Lys His Leu  
                             180                            185                            190

Ser Ile Gly Ile Gly Ile Asp Thr Pro Trp Thr Leu Cys Arg Ala Arg  
                             195                            200                            205

Val Ala Ser Val Tyr Asn Ile Asn Asn Ala Asn Ala Thr Phe Leu Trp  
                             210                            215                            220

Asp Trp Ala Pro Gly Gly Thr Pro Asp Phe Pro Glu Tyr Arg Gly Gln  
                             225                            230                            235                            240

His Pro Pro Ile Phe Ser Val Asn Thr Ala Pro Ile Tyr Gln Thr Glu  
                             245                            250                            255

Leu Trp Lys Leu Leu Ala Ala Phe Gly His Gly Asn Ser Leu Tyr Leu  
                             260                            265                            270

Gln Pro Asn Ile Ser Gly Ser Lys Tyr Gly Asp Val Gly Val Thr Gly  
                             275                            280                            285

Phe Leu Tyr Pro Arg Ala Cys Val Pro Tyr Pro Phe Met Leu Ile Gln  
                             290                            295                            300

Gly His Met Glu Ile Thr Leu Ser Leu Asn Ile Tyr His Leu Asn Cys  
                             305                            310                            315                            320

Ser Asn Cys Ile Leu Thr Asn Cys Ile Arg Gly Val Ala Lys Gly Glu



Asp Phe Leu Lys Met Arg Val Glu Met Leu His Met Lys Tyr Arg Asn  
                   580                                  585                                  590

Met Leu Gln His Gln His Leu Met Glu Leu Leu Lys Asn Lys Glu Arg  
                   595                                  600                                  605

Gly Asp Ala Gly Asp Asp Pro  
           610                                  615

<210> 15  
 <211> 615  
 <212> PRT  
 <213> Ovine pulmonary adenocarcinoma virus  
  
 <400> 15

Met Pro Lys Arg Arg Ala Gly Phe Arg Lys Gly Trp Tyr Ala Arg Gln  
 1                                  5                                  10                                  15

Arg Asn Ser Leu Thr His Gln Met Gln Arg Met Thr Leu Ser Glu Pro  
                   20                                  25                                  30

Thr Ser Glu Leu Pro Thr Gln Arg Gln Ile Glu Ala Leu Met Pro Tyr  
           35                                  40                                  45

Ala Trp Asn Glu Ala His Val Gln Pro Pro Val Thr Pro Thr Asn Ile  
           50                                  55                                  60

Leu Ile Met Leu Leu Leu Leu Leu Gln Arg Val Gln Asn Gly Ala Ala  
 65                                  70                                  75                                  80

Ala Ala Phe Trp Ala Tyr Ile Pro Asp Pro Pro Met Ile Gln Ser Leu  
                   85                                  90                                  95

Gly Trp Asp Arg Glu Ile Val Pro Val Tyr Val Asn Asp Thr Ser Leu  
                   100                                  105                                  110

Leu Gly Gly Lys Ser Asp Ile His Ile Ser Pro Gln Gln Ala Asn Ile  
           115                                  120                                  125

Ser Phe Tyr Gly Leu Thr Thr Gln Tyr Pro Met Cys Phe Ser Tyr Gln  
           130                                  135                                  140

Ser Gln His Pro His Cys Ile Gln Val Ser Ala Asp Ile Ser Tyr Pro  
 145                                  150                                  155                                  160

Arg Val Thr Ile Ser Gly Ile Asp Glu Lys Thr Gly Lys Lys Ser Tyr  
 165 170 175

Gly Asn Gly Thr Gly Pro Leu Asp Ile Pro Phe Cys Asp Lys His Leu  
 180 185 190

Ser Ile Gly Ile Gly Ile Asp Thr Pro Trp Thr Leu Cys Arg Ala Arg  
 195 200 205

Val Ala Ser Val Tyr Asn Ile Asn Asn Ala Asn Ala Thr Phe Leu Trp  
 210 215 220

Asp Trp Ala Pro Gly Gly Thr Pro Asp Phe Pro Glu Tyr Arg Gly Gln  
 225 230 235 240

His Pro Pro Ile Phe Ser Val Asn Thr Ala Pro Ile Tyr Gln Thr Glu  
 245 250 255

Leu Trp Lys Leu Leu Ala Ala Phe Gly His Gly Asn Ser Leu Tyr Leu  
 260 265 270

Gln Pro Asn Ile Ser Gly Thr Lys Tyr Gly Asp Val Gly Val Thr Gly  
 275 280 285

Phe Leu Tyr Pro Arg Ala Cys Val Pro Tyr Pro Phe Met Leu Ile Gln  
 290 295 300

Gly His Met Glu Ile Thr Leu Ser Leu Asn Ile Tyr His Leu Asn Cys  
 305 310 315 320

Ser Asn Cys Ile Leu Thr Asn Cys Ile Arg Gly Val Ala Lys Gly Glu  
 325 330 335

Gln Val Ile Ile Val Lys Gln Pro Ala Phe Val Met Leu Pro Val Glu  
 340 345 350

Ile Ala Glu Ala Trp Tyr Asp Glu Thr Ala Leu Glu Leu Leu Gln Arg  
 355 360 365

Ile Asn Thr Ala Leu Ser Arg Pro Lys Arg Gly Leu Ser Leu Ile Ile  
 370 375 380

Leu Gly Ile Val Ser Leu Ile Thr Leu Ile Ala Thr Ala Val Thr Ala  
 385 390 395 400

Cys Val Ser Leu Ala Gln Ser Ile Gln Ala Ala His Thr Val Asp Ser



405	410	415
Leu Ser Tyr Asn Val Thr Lys Val Met Gly Thr Gln Glu Asp Ile Asp 420 425 430		
Lys Lys Ile Glu Asp Arg Leu Ser Ala Leu Tyr Asp Val Val Arg Val 435 440 445		
Leu Gly Glu Gln Val Gln Ser Ile Asn Phe Arg Met Lys Ile Gln Cys 450 455 460		
His Ala Asn Tyr Lys Trp Ile Cys Val Thr Lys Lys Pro Tyr Asn Thr 465 470 475 480		
Ser Asp Phe Pro Trp Asp Lys Val Lys Lys His Leu Gln Gly Ile Trp 485 490 495		
Phe Asn Thr Asn Leu Ser Leu Asp Leu Leu Gln Leu His Asn Glu Ile 500 505 510		
Leu Asp Ile Glu Asn Ser Pro Lys Ala Thr Leu Asn Ile Ala Asp Thr 515 520 525		
Val Asp Asn Phe Leu Gln Asn Leu Phe Ser Asn Phe Pro Ser Leu His 530 535 540		
Ser Leu Trp Lys Thr Leu Ile Gly Leu Gly Ile Phe Val Ile Ile Ile 545 550 555 560		
Ala Ile Val Ile Phe Val Phe Pro Cys Val Val Arg Gly Leu Val Arg 565 570 575		
Asp Phe Leu Lys Met Arg Val Glu Met Leu His Met Lys Tyr Arg Thr 580 585 590		
Met Leu Gln His Arg His Leu Met Glu Leu Leu Lys Asn Lys Glu Arg 595 600 605		
Gly Ala Ala Gly Asp Asp Pro 610 615		

<210> 16  
 <211> 617  
 <212> PRT  
 <213> Ovine enzootic nasal tumour virus  
  
 <400> 16

Met	Pro	Lys	His	Arg	Ala	Gly	Phe	Arg	Lys	Gly	Trp	Tyr	Ala	Arg	Gln	1	5	10	15
Arg	Asn	Ser	Leu	Thr	Tyr	Gln	Met	Gln	Arg	Met	Thr	Leu	Asn	Glu	Thr	20	25	30	
Thr	Asn	Gly	Leu	Pro	Thr	Gln	Arg	Gln	Val	Glu	Ala	Leu	Met	Arg	His	35	40	45	
Ala	Trp	Asn	Glu	Ala	His	Val	Gln	Pro	Pro	Ala	Thr	Pro	Ile	Lys	Ile	50	55	60	
Leu	Ile	Met	Leu	Leu	Leu	Leu	Leu	Gln	Arg	Ile	Gln	Asn	Gly	Ala	Ala	65	70	75	80
Ala	Ala	Phe	Trp	Ala	Tyr	Ile	Pro	Asp	Pro	Pro	Met	Ile	Gln	Ser	Leu	85	90	95	
Gly	Trp	Asp	Arg	Glu	Ile	Val	Pro	Val	Tyr	Val	Asn	Asp	Thr	Ser	Leu	100	105	110	
Leu	Gly	Gly	Lys	Ser	Asp	Ile	His	Ile	Ser	Pro	Gln	Gln	Ala	Asn	Ile	115	120	125	
Ser	Phe	Tyr	Gly	Leu	Thr	Thr	Gln	Tyr	Pro	Met	Cys	Phe	Ser	Tyr	Gln	130	135	140	
Ser	Gln	His	Pro	His	Cys	Ile	Gln	Val	Ser	Ala	Asp	Ile	Ser	Tyr	Pro	145	150	155	160
Arg	Val	Thr	Ile	Ser	Gly	Ile	Asp	Glu	Lys	Thr	Gly	Lys	Arg	Ser	Tyr	165	170	175	
Arg	Asn	Gly	Thr	Gly	Pro	Leu	Asp	Ile	Pro	Phe	Cys	Asp	Lys	Asn	Leu	180	185	190	
Ser	Ile	Ser	Ile	Gly	Ile	Asp	Thr	Pro	Trp	Thr	Leu	Cys	Arg	Ala	Arg	195	200	205	
Ile	Ala	Ser	Val	Tyr	Asn	Ile	Asn	Asn	Ala	Asn	Thr	Thr	Leu	Leu	Trp	210	215	220	
Asp	Trp	Ala	Pro	Gly	Gly	Thr	Pro	Asp	Phe	Pro	Glu	Tyr	Arg	Gly	Gln	225	230	235	240

His Pro Pro Ile Leu Ser Val Asn Thr Ala Pro Ile Phe Gln Thr Glu  
 245 250 255

Leu Trp Lys Leu Leu Ala Ala Phe Gly His Gly Asn Ser Leu Tyr Leu  
 260 265 270

Gln Pro Asn Ile Ser Gly Ser Lys Tyr Gly Asp Val Gly Val Thr Gly  
 275 280 285

Phe Leu Tyr Pro Arg Ala Cys Val Pro Tyr Pro Phe Met Leu Ile Gln  
 290 295 300

Gly His Met Glu Ile Thr Leu Ser Leu Asn Ile Tyr His Leu Asn Cys  
 305 310 315 320

Ser Asn Cys Ile Leu Thr Asn Cys Ile Arg Gly Val Ala Lys Gly Glu  
 325 330 335

Gln Val Ile Ile Val Lys Gln Pro Ala Phe Val Met Leu Pro Val Glu  
 340 345 350

Ile Thr Glu Glu Trp Tyr Asp Glu Thr Ala Leu Glu Leu Leu Gln Arg  
 355 360 365

Ile Asn Thr Ala Leu Ser Arg Pro Lys Arg Gly Leu Ser Leu Ile Ile  
 370 375 380

Leu Gly Ile Val Ser Leu Ile Thr Leu Ile Ala Thr Ala Val Thr Ala  
 385 390 395 400

Ser Val Ser Leu Ala Gln Ser Ile Gln Ala Ala His Thr Val Asp Ser  
 405 410 415

Leu Ser Tyr Asn Val Thr Lys Val Met Gly Thr Gln Glu Asp Ile Asp  
 420 425 430

Lys Lys Ile Glu Asp Arg Leu Ser Ala Leu Tyr Asp Val Val Arg Val  
 435 440 445

Leu Gly Glu Gln Val Gln Ser Ile Asn Phe Arg Met Lys Ile Gln Cys  
 450 455 460

His Ala Asn Tyr Lys Trp Ile Cys Val Thr Lys Lys Pro Tyr Asn Thr  
 465 470 475 480

Ser Asp Tyr Pro Trp Asp Lys Val Glu Lys His Leu Gln Gly Ile Trp

Leu Ile Met Leu Leu Leu Leu Gln Arg Ile Gln Asn Gly Ala Ala  
65 70 75 80

Ala Ala Phe Trp Ala Tyr Ile Pro Asp Pro Pro Met Ile Gln Ser Leu  
85 90 95

Gly Trp Asp Lys Glu Thr Val Pro Val Tyr Val Asn Asp Thr Ser Leu  
100 105 110

Leu Gly Gly Lys Ser Asp Ile His Ile Ser Pro Gln Gln Ala Asn Ile  
115 120 125

Ser Phe Tyr Gly Leu Thr Thr Gln Tyr Pro Met Cys Phe Ser Tyr Gln  
130 135 140

Ser Gln His Pro His Cys Ile Gln Val Ser Ala Asp Ile Ser Tyr Pro  
145 150 155 160

Arg Val Thr Ile Ser Gly Ile Asp Glu Lys Thr Gly Lys Arg Ser Tyr  
165 170 175

Arg Asp Gly Thr Gly Pro Leu Asp Ile Pro Phe Cys Asp Lys His Leu  
180 185 190

Ser Ile Gly Ile Gly Ile Asp Thr Pro Trp Thr Leu Cys Arg Ala Pro  
195 200 205

Ile Ala Ser Val Tyr Asn Ile Asn Asn Ala Asn Thr Thr Leu Leu Trp  
210 215 220

Asp Trp Ala Pro Gly Gly Thr Pro Asp Phe Pro Glu Tyr Arg Gly Gln  
225 230 235 240

His Pro Pro Ile Phe Ser Val Asn Thr Ala Pro Ile Tyr Gln Thr Glu  
245 250 255

Leu Trp Lys Leu Leu Ala Ala Phe Gly His Gly Asn Ser Leu Tyr Leu  
260 265 270

Gln Pro Asn Ile Ser Gly Ser Lys Tyr Gly Asp Val Gly Val Thr Gly  
275 280 285

Phe Leu Tyr Pro Arg Ala Cys Val Pro Tyr Pro Phe Met Leu Ile Gln  
290 295 300

Gly His Met Glu Ile Thr Leu Ser Leu Asn Ile Tyr His Leu Asn Cys  
305 310 315 320

Ser Asn Cys Ile Leu Thr Asn Cys Ile Arg Gly Val Ala Lys Gly Glu  
                   325                  330                  335

Gln Val Ile Ile Val Lys Gln Pro Ala Phe Val Met Leu Pro Val Glu  
                   340                  345                  350

Ile Thr Glu Glu Trp Tyr Asp Glu Thr Ala Leu Glu Leu Leu Gln Arg  
                   355                  360                  365

Ile Asn Thr Ala Leu Ser Arg Pro Lys Arg Gly Leu Ser Leu Ile Ile  
                   370                  375                  380

Leu Gly Ile Val Ser Leu Ile Thr Leu Ile Ala Thr Ala Val Thr Ala  
 385                  390                  395                  400

Ser Val Ser Leu Ala Gln Ser Ile Gln Ala Ala His Thr Val Asp Ser  
                   405                  410                  415

Leu Ser Ser Asn Val Thr Lys Val Met Gly Thr Gln Glu Asn Ile Asp  
                   420                  425                  430

Lys Lys Ile Glu Asp Arg Leu Ser Ala Leu Tyr Asp Val Val Arg Val  
                   435                  440                  445

Leu Gly Glu Gln Val Gln Ser Ile Asn Phe Arg Met Lys Ile Gln Cys  
                   450                  455                  460

His Ala Asn Tyr Lys Trp Ile Cys Val Thr Lys Lys Pro Tyr Asn Thr  
 465                  470                  475                  480

Ser Asp Phe Pro Trp Asp Lys Val Lys Lys His Leu Gln Gly Ile Trp  
                   485                  490                  495

Phe Asn Thr Thr Val Ser Leu Asp Leu Leu Gln Leu His Asn Glu Ile  
                   500                  505                  510

Leu Asp Ile Glu Asn Ser Pro Lys Ala Thr Leu Asn Ile Ala Asp Thr  
                   515                  520                  525

Val Asp Asn Phe Leu Gln Asn Leu Phe Ser Asn Phe Pro Ser Leu His  
                   530                  535                  540

Ser Leu Trp Arg Ser Ile Ile Ala Met Gly Ala Val Leu Thr Val Val  
 545                  550                  555                  560

Leu Ile Ile Ile Cys Leu Ala Pro Cys Leu Ile Arg Ser Ile Val Lys

565

570

575

Glu Phe Leu His Met Arg Val Leu Ile His Lys Asn Met Leu Gln His  
                   580                                  585                                  590

Gln His Leu Met Glu Leu Leu Lys Asn Lys Glu Arg Gly Ala Ala Gly  
                   595                                  600                                  605

Asp Asp Pro  
           610

<210> 18  
 <211> 611  
 <212> PRT  
 <213> Ovis aries

<400> 18

Met Pro Lys Arg Arg Ala Gly Phe Arg Lys Gly Trp Tyr Ala Arg His  
   1                  5                                  10                                  15

Lys Asn Ser Leu Thr His Gln Met Gln Arg Met Thr Leu Ser Glu Pro  
                   20                                  25                                  30

Thr Ser Glu Leu Pro Thr Gln Arg Gln Ile Glu Ala Leu Met Arg Tyr  
                   35                                  40                                  45

Ala Trp Asn Glu Ala His Val Gln Pro Pro Val Thr Pro Thr Asn Ile  
                   50                                  55                                  60

Leu Ile Met Leu Leu Leu Leu Gln Arg Ile Gln Asn Gly Ala Ala  
   65                                  70                                  75                                  80

Ala Ala Phe Trp Ala Tyr Ile Pro Asp Pro Pro Met Ile Gln Ser Leu  
                   85                                  90                                  95

Gly Trp Asp Lys Glu Thr Val Pro Val Tyr Val Asn Asp Thr Ser Leu  
                   100                                  105                                  110

Leu Gly Gly Lys Ser Asp Ile His Ile Ser Pro Gln Gln Ala Asn Ile  
                   115                                  120                                  125

Ser Phe Tyr Gly Leu Thr Thr Gln Tyr Pro Met Cys Phe Ser Tyr Gln  
                   130                                  135                                  140

Ser Gln His Pro His Cys Ile Gln Val Ser Ala Asp Ile Ser Tyr Pro  
   145                                  150                                  155                                  160

Arg Val Thr Ile Ser Gly Ile Asp Glu Lys Thr Gly Lys Arg Ser Tyr  
 165 170 175

Arg Asp Gly Thr Gly Pro Leu Asp Ile Pro Phe Cys Asp Lys His Leu  
 180 185 190

Ser Ile Gly Ile Gly Ile Asp Thr Pro Trp Thr Leu Cys Arg Ala Arg  
 195 200 205

Ile Ala Ser Val Tyr Asn Ile Asn Asn Ala Asn Thr Thr Leu Leu Trp  
 210 215 220

Asp Trp Ala Pro Gly Gly Thr Pro Asp Phe Pro Glu Tyr Arg Gly Gln  
 225 230 235 240

His Pro Pro Ile Leu Ser Val Asn Thr Ala Pro Ile Tyr Gln Thr Glu  
 245 250 255

Leu Trp Lys Leu Leu Ala Ala Phe Gly His Gly Asn Ser Leu Tyr Leu  
 260 265 270

Gln Pro Asn Ile Ser Gly Ser Lys Tyr Gly Asp Val Gly Val Thr Gly  
 275 280 285

Phe Leu Tyr Pro Arg Ala Cys Val Pro Tyr Pro Phe Met Leu Ile Gln  
 290 295 300

Gly His Met Glu Ile Thr Leu Ser Leu Asn Ile Tyr His Leu Asn Cys  
 305 310 315 320

Ser Asn Cys Ile Leu Thr Asn Cys Ile Arg Gly Val Ala Lys Gly Glu  
 325 330 335

Gln Val Ile Ile Val Lys Gln Pro Ala Phe Val Met Leu Pro Val Glu  
 340 345 350

Ile Thr Glu Glu Trp Tyr Asp Glu Thr Ala Leu Glu Leu Leu Gln Arg  
 355 360 365

Ile Asn Thr Ala Leu Ser Arg Pro Lys Arg Gly Leu Ser Leu Ile Ile  
 370 375 380

Leu Gly Ile Val Ser Leu Ile Thr Leu Ile Ala Thr Ala Val Thr Ala  
 385 390 395 400



Ser Val Ser Leu Ala Gln Ser Ile Gln Ala Ala His Thr Val Asp Ser  
 405 410 415

Leu Ser Tyr Asn Val Thr Lys Val Met Gly Thr Gln Glu Asp Ile Asp  
 420 425 430

Lys Lys Ile Glu Asp Arg Leu Ser Ala Leu Tyr Asp Val Val Arg Val  
 435 440 445

Leu Gly Glu Gln Val Gln Ser Ile His Phe Arg Met Lys Ile Gln Cys  
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His Ala Asn Tyr Lys Trp Ile Cys Val Thr Lys Lys Pro Tyr Asn Thr  
 465 470 475 480

Ser Asp Phe Pro Trp Asp Lys Val Lys Lys His Leu Gln Gly Ile Trp  
 485 490 495

Phe Asn Thr Asn Val Ser Leu Asp Leu Leu Gln Leu His Asn Glu Ile  
 500 505 510

Leu Asp Ile Glu Asn Ser Pro Lys Ala Thr Leu Asn Ile Ala Asp Thr  
 515 520 525

Val Asp Asn Phe Leu Gln Asn Leu Phe Ser Asn Phe Pro Ser Leu His  
 530 535 540

Ser Leu Trp Gln Ser Ile Ile Ala Met Gly Ala Val Leu Thr Val Val  
 545 550 555 560

Leu Ile Ile Ile Cys Leu Ala Pro Cys Leu Ile Arg Ser Ile Val Lys  
 565 570 575

Glu Phe Leu His Met Arg Val Leu Ile His Lys Asn Met Leu Gln His  
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Arg His Leu Met Glu Leu Leu Lys Asn Lys Glu Arg Gly Ala Ala Gly  
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Asp Asp Pro  
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 <213> Ovine pulmonary adenocarcinoma virus

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 <213> Ovis aries

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gttgagagta taaat 135